**Lesson**: Worm Bin- Chemistry **Grade**: 6

**Background**: This lesson falls into a chemistry unit in which students are learning about chemical compositions, physical changes, and plastic polymers, chemical changes. Students have already completed a unit on Energy and learned about conserving energy, renewable and nonrenewable resources. We use food a lot in this unit to explore mixtures, solutions, and all the properties of matter. Students have also made ice cream and we have learned about the some of the chemical changes in our body to digest food.

**Lesson Overview**: This lesson incorporates sustainability by learning about where our food comes from, how we fertilize it, and how much is wasted. Students will then learn about the worm bin and more sustainable ways to dispose of food, composting, and recycling. Students will then set up a scientific investigation using the scientific method growing plants with the worm castings and compare it with plants that receive chemical fertilizer, and no fertilizer at all. As an extension- Students can make a commercial, podcast, or advertisement about how to lower our food waste.

**Materials**: red worms, bin, newspaper, organic food scraps, basil seeds, pots, soil, measuring cups, paper towels.

Resource- <https://www.youtube.com/watch?v=V8miLevRI_o>

http://video.nationalgeographic.com/video/green-guide-howdini/compost-gg

**Objective**: I can explore the growing epidemic of food waste and its impact on the environment then design a scientific investigation after learning about more sustainable options

**Vocabulary**: organic, decompose, compost, waste, sustainable, fertilizer, castings

**Questioning**:

* Where does our food come from?
* What kind of changes occur in our body when we eat food?
* How much food do we consume a year?
* How much food is wasted?
* How much ends up in landfills?
* Where does our garbage go?
* Are there other ways we can safely dispose of foods?
* What does it mean to decompose? What kind of changes occur when this happens?
* How can we make sure that we are living in a more sustainable way?
* What do you pledge to do to help reduce food waste?
* How does composting help you? Your community? The world?

**Lesson:**

1. **Save the Last Word Protocol-** Create groups of 4 and choose a time keeper in each group. Start by giving each student a different picture, diagram, or visual representation of the problem of the amount of food waste. Students will first write what they think the significance of the image is. One student will start and has 1 minute to share with the group what they think is most important to know from looking at the visual. The presenter will not share why he/she chose that to be the most significant. The group should pause and consider what was said before responding. Each group member then has 1 minute to respond to the presenter’s image and ask questions that it raises for them. The presenter should just be listening now. When the group is done, the presenter can come back into the conversation and build on or respond to group members and discuss. Repeat this process until everyone has shared.
2. **Whole class discussion about the images**. Inform students of how much waste ends up in landfills every year, and how most of it is organic food waste. Introduce lesson vocabulary. Model the worm bin and the science behind how it works.

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1. **Show videos**: <https://www.youtube.com/watch?v=V8miLevRI_o>

<http://video.nationalgeographic.com/video/green-guide-howdini/compost-gg>

Class discussion-

Are there other ways we can safely dispose of foods?

What does it mean to decompose?

What kind of changes occur when this happens?

How are chemical changes occurring when food substances break down?

How can we make sure that we are living in a more sustainable way?

**Work Period:**

1. Pass out materials- each group will get pots, soil, fertilizer, castings, water, measuring cups, mixing spoons. Instruct students that they can observe the materials and use them to help set up the investigation design, however they should not set up the experiment yet.
2. Students will follow the steps of the scientific method to set up an investigation. Start by asking a testable question- how will the type of fertilizer affect a plant’s growth?
3. Identify the variables in the experiment- independent (fertilizer), dependent (plant growth), control (no fertilizer) , constants (seed, soil, water, sunlight). Students will complete an investigation design diagram to identify the levels of the experiment.
4. Use research articles, videos, computers- if needed, and observations of the fertilizers to come up with a hypothesis.
5. Students will then write the procedure- determine student roles, and set up their experiment. Students will return to this project throughout the unit to take measurements, and write conclusions.

**Share:**

How does composting food help us live in a more sustainable way?

**Closing**: How will you help reduce food waste? How will you get your family to help? Your friends at school? Your teachers?

**Extension**: Create a video, advertisement, or podcast to inform others of how to throw away less food and dispose of food in an environmentally friendly way?

**Supports:**

Vocabulary word bank, video notes graphic organizer, scientific method graphic organizers and sentence starters as needed

**Standards:**

[CCSS.ELA-LITERACY.RST.6-8.3](http://www.corestandards.org/ELA-Literacy/RST/6-8/3/)

Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

[CCSS.ELA-LITERACY.RST.6-8.4](http://www.corestandards.org/ELA-Literacy/RST/6-8/4/)

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-8 texts and topics*.

[CCSS.ELA-LITERACY.RST.6-8.7](http://www.corestandards.org/ELA-Literacy/RST/6-8/7/)

Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

[CCSS.ELA-LITERACY.RST.6-8.9](http://www.corestandards.org/ELA-Literacy/RST/6-8/9/)

Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

**Danielson**:

Component 3c: Engaging Students in Learning

Virtually all students are intellectually engaged in challenging content through well- designed learning tasks and activities that require complex thinking by students. The teacher provides suitable scaffolding and challenges students to explain their thinking. There is evidence of some student initiation of inquiry and student contributions to the exploration of important content; students may serve as resources for one another. The lesson has a clearly defined structure, and the pacing of the lesson provides students the time needed not only to intellectually engage with and reflect upon their learning but also to consolidate their understanding

Virtually all students are intellectually engaged in the lesson. • Lesson activities require high- level student thinking and explanations of their thinking. • Students take initiative to improve the lesson by (1) modifying a learning task to make it more meaningful or relevant to their needs, (2) suggesting modifications to the grouping patterns used, and/or (3) suggesting modifications or additions to the materials being used. • Students have an opportunity for reflection and closure on the lesson to consolidate their understanding.







 